

REMARKS

In the Office Action of August 13, 2002, claims 1-15 stand rejected. Applicants respectfully traverse these rejections. Reconsideration and allowance of all pending claims are respectfully requested in view of the following remarks.

I. SPECIFICATION OBJECTIONS

The specification was objected to based on the title being non-descriptive. The current title is "Lithium Anodes for Electrochemical Cells." The examiner suggested amending the title to read "Multilayer Structure in Contact with a Lithium Anode for Electrochemical Cells" The applicants, after considering the examiner's suggestion, respectfully request that the title be amended to "Lithium Anodes for Electrochemical Cells Comprising a Multilayer Structure."

II. CLAIM REJECTIONS

A. 35 U.S.C. § 112

Claim 11 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the examiner contends that the term "temporary" as used in claim 11 is unclear. The specification, according to the examiner, does not clearly disclose how the metals are held as "temporary". The applicants respectfully traverse this rejection.

The specification discusses the nature of what is a temporary layer. First, the "temporary protective material layer acts as a barrier layer to protect the lithium surface during the deposition of other anode layers, such as the multi-layer structure of the present invention". Page 12, lines 8 to 10. After manufacturing, "[d]uring subsequent storage of an anode of this invention, comprising the first anode active layer and the temporary protective metal layer, or during storage of an electrochemical cell into which an anode of the present invention is assembled, or during electrochemical cycling of the cell comprising an anode of the present invention, the temporary protective layer is capable of forming an alloy with, dissolving into, blending with, or diffusing into the lithium metal to form a single anode active layer comprising lithium metal. Page 13, lines 6-11, emphasis added. Therefore, from the specification, the

temporary layer is applied to protect the anode during construction and then it is alloyed with, dissolved, blended, diffused upon storage or use. Thus at some point after manufacture the layer no longer exists and is therefore temporary. This clearly shows what is meant by temporary. Additionally, the mere fact that the same materials may be disclosed as layers in other patents do not make them “temporary” layers unless the art clearly identifies them as such. The temporary nature of a layer may depend on the thickness of the layer, temperature, the material it is adjacent to and other factors. Page 13, lines 11-17. The mere recitation of similar or the same material without a discussion of how the prior art material is temporary can not be the basis of a rejection. It must be shown, for example, where in the Japanese patent, JP 08 279 357A, that the materials are specifically discussed as being temporary layers.

In view of the above arguments, the section 112 rejection is without merit and claim 11 is in condition for allowance.

B. 35 U.S.C. § 102(b)

Claims 14 and 15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,314,765 and issued to Bates (*Bates*). Applicants respectfully traverse this rejection.

In order to sustain a rejection under 35 U.S.C. § 102(b), each and every element as set forth in the claim must be found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 528, 631 (Fed. Cir. 1987). Indeed, “the identical invention must be shown in as complete detail as is contained in the... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1235 (Fed. Cir. 1987). Because the claims of the present invention contain elements not found in *Bates*, this rejection must fail.

The examiner contends the protective film of *Bates* can be a multi-layer structure with each layer being comprised of the same material. Applicants respectfully traverse the rejection.

Claim 14, as amended, recites in part “wherein at least one of said three or more layers comprises a single ion conducting layer and at least one of said three or more layers comprises a polymer layer.” Therefore, claim 14, as amended, requires at least one single ion conducting layers and at least one polymer layer. Therefore, all layers could not be comprised of the same material. Thus, *Bates* fails to teach all limitations of claim 14.

Considering claim 15, the examiner indicates that due to the inherent nature of sputtering at least four atomic layers are deposited whenever a material is deposited by sputtering. The examiner seems to be saying that since sputtering is used, at least four layers on the atomic level

are always deposited. Applicants object to the examiners reasoning. First, the concept of layer in claim 15 does not mean an atomic layer. Indeed, consider what *Bates* shows. *Bates* indicates that one of the layers disclosed, the film layer 28, can be a lithium phosphorus oxynitride layer having a thickness of .1 to .5 microns. (*Bates*, Col. 2, lines 34-48). Clearly, this layer is greater than four atomic layers. Thus, *Bates* shows that the word layer as used in the art does not mean atomic layer. Note that *Bates* is used by the examiner to support the 102(b) rejection. Additionally, the applicants do not define layers as an atomic layer. For example, applicants note that the third layer may vary from 5 nanometers to about 5,000 nanometers. (Page 14, lines 21-22). Of course, it is well known that the applicant can be his own lexicographer. M.P.E.P. 2111.01. Therefore, the examiner's argument that there are at least four atomic layers in an applied layer is immaterial. Neither the applicants nor others in the art define layer as an atomic layer. Additionally, neither *Bates* nor any of the other disclosed art disclose, teach or suggest four or more layers as disclosed in claim 15. Therefore, claim 15 is in condition for allowance. Also, claim 15 depends from allowable claim 14. Therefore, for at least this reason, claim 15 is allowable.

C. 35 U.S.C. § 103

To establish a prima facie case of obviousness under 35 U.S.C. § 103, three requirements must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. M.P.E.P. 2143.

1. Bates in view of Okamoto

Claims 1, 3-5 and 10-13 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over *Bates* in view of U.S. Patent No. 5,441,831 to Okamoto (*Okamoto*). Because the combination of *Bates* and *Okamoto* fail to teach or suggest all the limitations of these claims, Applicants respectfully request that these rejections be withdrawn.

Claim 1, as amended, recites in part, "wherein said multi-layer structure comprises at least three or more layers, at least one of said three or more layers comprises a single ion

conducting layer and at least one of said three or more layers comprises a polymer layer.” As discussed previously, *Bates* does not disclose, teach or suggest such a multi-layer structure. Additionally as discussed earlier, the layers of the present invention are not atomic layers, as argued by the examiner. The addition of *Okamoto* to *Bates* does not disclose, teach or suggest all of the claim limitations of claim 1, as amended. Therefore, claim 1, as amended, is in condition for allowance.

Considering claims 3-4, the *Bates/Okamoto* combination does not disclose teach or suggest multi-layer structures comprising three or more layers with the thickness in the range given in claims 3 and 4. Thus, claims 3-4 are allowable. Additionally, claims 3 and 4 depend from allowable claim 1; therefore, claim 3 and 4 are allowable.

Considering claim 5, the examiner contends that in any multi-layer structure there are at least four atomic layers. This rejection has already been discussed in conjunction with the section 102(b) rejection of claim 15. The applicants do not define a layer as an atomic layer. That definition is a creation of the examiner alone and is an incorrect interpretation of the claim. Therefore, the *Bates/Okamoto* combination does not disclose, teach or suggest a four layer structure. Therefore, claim 5 is allowable for at least this reason. Also claim 5 depends from allowable claim 1; therefore claim 5 is allowable.

Considering claims 10-13, claims 10-13 depend from allowable claim 1; therefore claims 10-13 are in condition for allowance.

2. Bates in view of Okamoto in view of Bates II

Claim 2 stands rejected under 35 U.S.C. 103 (a) as unpatentable under *Bates*, in view of *Okamoto* and further in view of U.S. Patent No. 5,569,520 to Bates (*Bates II*).

Claim 2 depends from allowable claim 1; therefore, claim 2 is in condition for allowance.

3. Bates in view of Okamoto in view of JP

Claim 6 stands rejected as unpatentable over *Bates* in view of *Okamoto* and further in view of Japanese patent No. 09-279357 (JP). The examiner contends that the combination of *Bates* and *Okamoto* can have the metal coating of *JP* added directly over the anode of the

Bates/Okamoto combination and that would be the same as what is disclosed in claim 11. This however, would change the operation of *Bates*. *Bates* discloses a protective layer that is placed in direct contact with the anode to prevent the formation of a film of barrier chemicals, to reduce the formation of dendrites. To remove this layer from *Bates* would destroy the use of the protective layer of *Bates*. Therefore, the addition of *JP* to *Bates* would render *Bates* unsatisfactory for its intended purpose. Of course, “[I]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” M.P.E.P. 2143.01. Thus, claim 6 is in condition for allowance. Additionally claim 6 depends from allowable claim 1; therefore claim 6 is allowable.

4. Bates in view of Okamoto in view of Chu

Claim 9 stands rejected as unpatentable over *Bates*, *Okamoto* and U.S. Patent No. 6,413, 285 to Chu (*Chu*).

Claim 9 depends from claim 1, which is in condition for allowance; therefore, Claim 9 is in condition for allowance.

5. Bates in view of Okamoto in view of JP

Claim 11 stands rejected as unpatentable over *Bates* in view of *Okamoto* and further in view of *JP*.

The § 112 rejection and the use of the word “temporary” in claim 11 have been discussed. While *JP* may discuss a metal coating, these coating presumably exist throughout the life of the cell disclosed in *JP*. Under any definition of temporary, the metal layer of *JP*, which provides for what seems to be a permanent layer, is not temporary. Thus, claim 11 is allowable. Also, claim 11 depends from allowable claim 1; therefore, claim 11 is allowable.

6. Bates in view of Okamoto in view of Skotheim

Claims 12 and 13 stand rejected under 35 U.S.C. 103 (a) as unpatentable over *Bates* in view of *Okamoto* and further in view of U.S. Patent No. 5,648, 187 to Skotheim (*Skotheim*).

Claims 12 and 13 depend from allowable claim 1; therefore claims 12 and 13 are allowable.

7. Skotheim in view of what is known in the art

Claims 1, 3-5 and 10-15 stand rejected under 35 U.S.C. 103 (a) as unpatentable over *Skotheim*.

Considering independent claims 1 and 14, the examiner uses the same argument in regards to *Skotheim* as he did for *Bates*- namely, the multi-layer structure as claimed can be composed of three or more layers of the same material- namely a polymer layer. Claims 1 and 14, as amended, both recite in part “wherein said multi-layer structure comprises three or more layers, wherein at least one of said three or more layers comprises a single ion conducting layer and at least one of said three or more layer comprises a polymer layer.” Claims 1 and 14, as amended, do not have multiple layers with each layer comprised of a polymer layer. Consequently, *Skotheim* does not disclose, teach or suggest all the limitations of claims 1 and 14. Claims 1 and 14 are in condition for allowance.

Claims 3-5 and 10-13 are dependent on allowable claim 1; therefore, claims 3-5 and 10-13 are allowable. Claim 15 depends from allowable claim 14; therefore claim 15 is also in condition for allowance.

D. DOUBLE PATENTING

Claims 1, 2, 5-8 and 10-15 stand provisionally rejected under the judicially created doctrine of obviousness- type double patenting as being unpatentable over claims 1, 9, 11, 37, 38, 43, 45-50 and 57 of co-pending application No. 09/721,519. A terminal disclaimer will be submitted upon allowance of the above claims, in response to this rejection.

Claims 14 and 15 stand provisionally rejected under the judicially created doctrine of obviousness- type double patenting as being unpatentable over claim 1 and 6 of copending application No. 09/864,890. A terminal disclosure will be submitted upon allowance of the above claims in response to this rejection.

AMENDMENT under 37 C.F.R. § 1.111
Application No. 09/721,578

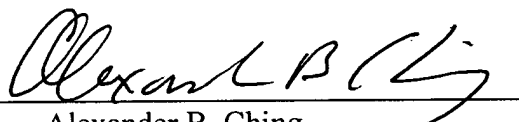
IV. CONCLUSION

For the foregoing reasons, the Application is believed to be in condition for allowance and favorable action is respectfully requested. The examiner is invited to telephone the undersigned at the telephone number listed below if it would in any way advance prosecution of this case.

While no fees are believed due, applicants hereby request that any other required fee to maintain pendency of this case, except for the Issue Fee, be charged to Deposit Account No. 19-3878.

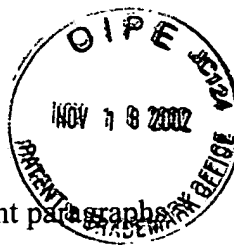
Respectfully submitted,

November 12, 2002
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AMENDMENT under 37 C.F.R. § 1.111
Application No. 09/721,578



Appendix A – Marked up copy of replacement paragraph

Please amend the paragraph beginning at page 25, line 29 and continuing to page 26, line 8 with the following:

Examples of sulfur-containing polymers include those described in: U.S. Patent Nos. 5,601,947 and 5,690,702 to Skotheim *et al.*; U.S. Patent No. 5,529,860 and 6,117,590 to Skotheim *et al.*; **U.S. Pat. No. 6,201,100 [U.S. Pat. Application Ser. No. 09/995,122]** to Gorkorenko *et al.* [of the common assignee] and PCT Publication No. WO 99/33130. Other suitable electroactive sulfur-containing materials comprising polysulfide linkages are described in U.S. Pat. No. 5,441,831 to Skotheim *et al.*; U.S. Pat. No. 4,664,991 to Perichaud *et al.*, and in U.S. Pat. Nos. 5,723,230, 5,783,330, 5,792,575 and 5,882,819 to Naoi *et al.* Still further examples of electroactive sulfur-containing materials include those comprising disulfide groups as described, for example in, U.S. Pat. No. 4,739,018 to Armand *et al.*; U.S. Pat. Nos. 4,833,048 and 4,917,974, both to De Jonghe *et al.*; U.S. Pat. Nos. 5,162,175 and 5,516,598, both to Visco *et al.*; and U.S. Patent No. 5,324,599 to Oyama *et al.*

Please amend the paragraph beginning at page 30, line 5-13 with the following:

A variety of separator materials are known in the art. Examples of suitable solid porous separator materials include, but are not limited to, polyolefins, such as for example, polyethylenes and polypropylenes, glass fiber filter papers, and ceramic materials. Further examples of separators and separator materials suitable for use in this invention are those comprising a microporous xerogel layer, for example a microporous pseudo-boehmite layer, which may be provided either as a free standing film or by a direct coating application on one of the electrodes as described in **U.S. Pat. No. 6,153,337 and U.S. Pat. No. 6,306,545 [U.S. Pat. Application Ser. Nos. 08/995,089 and 09/215,112]** by Carlson *et al.* [of the common assignee]. Solid electrolytes and gel electrolytes may also function as a separator in addition to their electrolyte function.

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Appendix B -- Marked up Claims

1. (AMENDED ONCE) An electrochemical cell comprising:
 - (a) a cathode comprising an electroactive sulfur-containing material;
 - (b) an anode; and
 - (c) a non-aqueous electrolyte interposed between said anode and said cathode, wherein said anode comprises:
 - (i) a first anode active layer comprising lithium metal; and
 - (ii) a multi-layer structure in contact with a surface layer of said first anode active layer, **wherein said multi-layer structure comprises three or more layers, wherein at least one of said three or more layers comprises a single ion conducting layer and at least one of said three or more layers comprises a polymer layer** [wherein each of said three or more layers comprises a layer selected from the group consisting of a single ion conducting layers and polymer layers].
14. (AMENDED ONCE) An anode of an electrochemical cell, wherein said anode comprises:
 - (i) a first anode active layer comprising lithium metal; and
 - (ii) a multi-layer structure in contact with a surface layer of said first anode active layer, wherein said multi-layer structure comprises three or more layers, **wherein at least one of said three or more layers comprises a single ion conducting layer and at least one of said three or more layers comprises a polymer layer** [wherein each of said three or more layers comprises a layer selected from the group consisting of a single ion conducting layers and polymer layers].